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## A NEW MAXIMUM IN WATER CONSUMPTION AND FROZEN SERVICE LINES<sup>1</sup>

BY F. E. KINGSBURY<sup>2</sup>

The extreme severity of the past (1917-1918) winter developed, to a remarkable degree, two phases affecting the water distribution in the City of St. Louis; that is, the abnormal consumption of water during the period of low temperature, and the freezing of service lines that were supposed to be of sufficient depth to be out of danger from that source. Extremely cold weather is seldom known in this locality, but last winter the unusual conditions prevailing throughout the country were experienced to a great extent in St. Louis and vicinity.

During normal weather in 1917, the average daily consumption of water in St. Louis was 92,000,000 gallons. In hot and dry weather, when 570 miles of streets are sprinkled five and often six times a day, 15,000,000 gallons or more are used for this purpose. Add to this the amount used for street flushing at night and the innumerable lawns that are sprinkled both day and night, and it is possible to account for a maximum summer consumption of water on June 26 of 133,900,000 gallons.

One might naturally suppose that a protracted hot, dry summer would tax the Water Department more than at any other time. But such was not the case in St. Louis during 1917. In fact, the greatest consumption of water in the history of the city for any twenty-four hour period was experienced on the coldest day of the season. On this day, January 12, 1918, the United States Government official thermometer recorded a minimum temperature of  $-17^{\circ}$  and the St. Louis Water Department showed a consumption of 156,500,000 gallons of water, 64,500,000 gallons above the normal

<sup>1</sup> Read before the St. Louis convention in May, 1918, and referred to Committee on Cold Weather Troubles. Discussion is requested and should be sent to the Editor.

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amount used. In line with the above, it will be of interest to quote from a paper read by Edward E. Wall, Water Commissioner, before the Engineers' Club of St. Louis, March 13, 1918:

From December 28th to February 8th inclusive, a period of 43 days, an average of 126,400,000 gallons was recorded. It must be remembered that no water could be used during this time for street sprinkling or washing, so that the normal use of water would have been no more than during moderately cold weather in November or March, when the consumption averaged about 92,000,000 gallons. The difference between 92,000,000 and 126,400,000 would represent what may be called the super-waste of water during a period of 43 days, amounting to \$60,000 at the rate of \$40 per million gallons.

The use of 92,000,000 gallons daily under moderate weather conditions is about 120 gallons per capita, meaning that at least 10,000,000 gallons are normally wasted during the periods of most favorable weather, and super-waste occurs at all other times. The coal burned per million gallons of water pumped, by actual weights taken in the boiler rooms, averaged 3800 pounds. This means that over 65 tons of coal were consumed each day for 43 days in pumping water that was allowed to run to waste into drains and sewers. This 2800 tons of coal was consumed at a time when the United States Fuel Administrator was urging economy and restricting coal deliveries to the bare necessities of preferred classes of consumers.

As long as the cold weather lasted, a great amount of water was used above the normal consumption of 92,000,000 gallons, and it is safe to say that it was wasted by allowing faucets throughout the city to run night and day in order to avoid the freezing of fixtures which have actually been installed frost-proof, for the city ordinances require that every residence must have a cut-off and drain inside the building where the service line enters. Obviously, this need only be turned off during the nights of severe cold, as there is always sufficient water being used during the day to prevent freezing.

Investigation showed that in some residences all faucets on the premises were left wide open. This was, without question, an extravagant waste, yet a large number of citizens exercised some judgment, and in districts where frozen pipes were anticipated, moderation was used in the amount of water allowed to flow.

A short time ago, one of the St. Louis daily papers published an open letter that contained a frank admission of the above facts and also stated the remedy: He says:

Last winter a valve in my house leaked, the water dripped continually; I informed the landlord, but, because it cost him no more to let it leak, he neglected to make the necessary repairs, and I, being no better than the

average, because it cost me no more, did not insist on it. Consequently the water dripped for months. Pure waste, which would have been quickly stopped had either landlord or I been paying for water by meter.

In severe weather the proper way to keep the pipes from freezing is to turn off the water from the house and drain the pipes each night. This is a bother and takes time. It is easier to let the water run all night, and it doesn't cost any more. I do it the easy way, so do you; if we had meters we wouldn't and we would save water.

No one wants to skimp on water; let us use all we need, but why waste it? (Signed) Charles Baker.

There are many others of the Charles Baker type who waste water because they pay for it on the flat rate. They do not seem to realize that with economy water would cost less on a meter rate. But the sentiment at large is against meters at the present time.

The City of St. Louis was rather fortunate in not having any street mains frozen. However, there were quite a number of private services from the street main into residences that were frozen to a greater or less extent. Most of the frozen service pipes were in sections of the city where street grades had been lowered after the water lines had previously been placed in accordance with the usual requirements.

All services are the property of the consumer and not of the Water Division, so that the responsibility for their maintenance and repair does not rest with the city. If the Water Division owned these services and was required to keep them in working order, it might be an economical proposition to allow a limited waste of water to prevent freezing of services, rather than to assume the expense of repairing numerous burst pipes.

The Water Department has supervision over the laying of service lines that are more than 2 inches in diameter. All services over 2 inches in diameter are of cast iron pipe and are installed by the Water Division from the city main to the building line at the expense of the owner. There were no reported cases where cast iron services, in use, were frozen.

Most of the frozen lines were the usual  $\frac{5}{8}$ -inch or  $\frac{3}{4}$ -inch lead services to private property. The thawing of them was handled by local plumbers, who rarely have to cope with a situation of the kind, and consequently the emergency was met in a great variety of ways that were more or less crude, but nevertheless solved the problem. They are recorded as a matter of history only, and not as examples to be followed, except in cases where better methods are out of the question.

Inquiry at some of the largest plumbing supply houses of St. Louis revealed the fact that they do not make or handle any device suitable for thawing service lines. One of the large supply houses reported that years ago they offered for sale an electrical thawing apparatus, which proved unsatisfactory, and the sale was discontinued.

Some plumbers advised their patrons to let the situation take care of itself, trusting that, in the course of a short time, the earth would thaw again. Others proceeded with the expensive method of digging the frozen ground, thawing the service pipe and then lowering it to a sufficient depth.

A number of the local plumbers, however, have constructed a portable steamer to which is attached a quarter-inch rubber tubing. This is inserted into the service pipe and pushed through as fast as the thawing will permit. This method required from three to eight hours, depending on conditions, the cost ranging from \$10 to \$15. It is stated that no service thawed in such a manner was ever frozen a second time.

The Water Division has a record of one case where a plumber undertook to thaw a frozen service line and proceeded in the old way to dig the frozen ground. Then the service pipe was thawed and lowered, the frozen earth replaced as well as possible, sand being used to fill the voids, which was necessary to make a good foundation for re-surfacing the street. The statement rendered for this job included: 37 hours for plumber's time at \$1.25 per hour, 69 hours for plumber's helper at 75 cents per hour, and \$9 for repaving the street and city inspection. The total amount of the bill was \$141.15.

From the best information obtainable throughout the country at large, the electrical outfit is by far the most satisfactory method in cost, time, labor and every other way, where a great number of services or even street mains are to be thawed. Especially should an apparatus of this kind be ready for use in localities where freezing is an annual occurrence, and where the water department is so unfortunate as to own the service lines from street mains to the property. But in moderate climates and where frozen services are an exception rather than the rule, the small portable steam outfit with rubber tubing is sufficient for the emergency, when the thawing is done by local plumbers.